

# AMENDMENTS TO THE CLAIMS

Please replace all prior versions, and listings, of claims in the application with the following list of claims:

1. (Currently Amended)      [[A]]Optical fiber apparatus, comprising:  
an optical fiber having a first section and a second section coupled to the first section, the first section having a gain medium including a first active material and the second section having a gain medium including a second active material;  
a first reflector disposed in the first section of the optical fiber, the first reflector being configured to reflect substantially all energy impinging thereon at a first wavelength; ~~and~~  
a second reflector disposed in the optical fiber outside the first section of the optical fiber, the second reflector being configured to reflect substantially all energy impinging thereon at the first wavelength~~[[.]]; and~~  
a third reflector disposed in the optical fiber, the third reflector being configured to partially reflect energy impinging thereon at a second wavelength different than the first wavelength.
  
2. (Currently Amended)      The optical fiber apparatus of claim 1, wherein the first active material is the same as the second active material.
  
3. (Currently Amended)      The optical fiber apparatus of claim 1, wherein the first active material is different than the second active material.
  
4. (Currently Amended)      The optical fiber apparatus of claim ~~[[1]]~~ 3, wherein the first and second sections are spliced together.
  
5. (Currently Amended)      The optical fiber apparatus of claim ~~[[4]]~~ 3, wherein the first reflector comprises a fiber Bragg grating.
  
6. (Currently Amended)      The optical fiber apparatus of claim ~~[[3]]~~ 4, wherein the second reflector comprises a fiber Bragg grating.

7. (Currently Amended) The optical fiber apparatus of claim 6, wherein the first active material comprises  $\text{GeO}_2$ .
8. (Currently Amended) The optical fiber apparatus of claim 7, wherein the second active material comprises  $\text{P}_2\text{O}_5$ .
9. (Currently Amended) The optical fiber apparatus of claim [[1]] 3, wherein the second reflector comprises a fiber Bragg grating.
10. (Currently Amended) The optical fiber apparatus of claim [[1]] 3, wherein the first active material comprises  $\text{GeO}_2$ .
11. (Currently Amended) The optical fiber apparatus of claim 10, wherein the second active material comprises  $\text{P}_2\text{O}_5$ .
12. (Currently Amended) The optical fiber apparatus of claim [[1]] 3, wherein the first active material comprises  $\text{P}_2\text{O}_5$ .
13. (Currently Amended) The optical fiber apparatus of claim 3 wherein the fiber comprises a Raman laser or amplifier and wherein the fiber further comprises a fourth reflector disposed in the optical fiber between said first and second reflectors, the fourth reflector configured to reflect substantially all energy impinging thereon at the second wavelength. The fiber of claim 1, further comprising a third reflector disposed in the optical fiber.
14. (Currently Amended) The optical fiber apparatus of claim [[13]] 3, wherein the third reflector comprises a fiber Bragg grating.
15. (Currently Amended) The optical fiber apparatus of claim [[13]] 3, wherein the third reflector is disposed outside the first section of the optical fiber.

16. (Currently Amended) The optical fiber apparatus of claim 15, wherein the third reflector is between the first and second reflectors.

17. (Currently Amended) The optical fiber apparatus of claim 13, wherein a length of fiber of the first section having the first active material and a length of fiber of the second section having the second active material are interposed between said first and second reflectors, the third reflector is configured to partially reflect energy impinging thereon at a second wavelength different than the first wavelength.

18. (Currently Amended) The optical fiber apparatus of claim [[13]] 3, wherein the first and second sections are spliced together.

19. (Currently Amended) The optical fiber apparatus of claim [[13]] 3, further comprising a fourth reflector disposed in the optical fiber.

20. (Currently Amended) The optical fiber apparatus of claim 19, wherein the fourth reflector comprises a fiber Bragg grating.

21. (Currently Amended) The optical fiber apparatus of claim 19, wherein the fourth reflector is disposed outside the first section of the optical fiber.

22. (Currently Amended) The optical fiber apparatus of claim 21, wherein the fourth reflector is between the first and third reflectors.

23. (Currently Amended) The optical fiber apparatus of claim 19, wherein the fourth reflector is configured to reflect substantially all energy impinging thereon at the second wavelength.

24. (Currently Amended) The optical fiber apparatus of claim 19, wherein the fourth reflector is disposed in the first section of the optical fiber.

25. (Currently Amended) The optical fiber apparatus of claim 19, wherein the first and second sections are spliced together.
26. (Currently Amended) The optical fiber apparatus of claim 19, further comprising a fifth reflector disposed in the optical fiber.
27. (Currently Amended) The optical fiber apparatus of claim 26, wherein the fifth reflector comprises a fiber Bragg grating.
28. (Currently Amended) The optical fiber apparatus of claim 26, wherein the fifth reflector is disposed in the first section of the optical fiber.
29. (Currently Amended) The optical fiber apparatus of claim 28, wherein the fifth reflector is between the first and fourth reflectors.
30. (Currently Amended) The optical fiber apparatus of claim 26, wherein the fifth reflector is configured to reflect substantially all energy impinging thereon at a ~~second~~ wavelength different than the first wavelength.
31. (Currently Amended) The optical fiber apparatus of claim 26, wherein the first and second sections are spliced together.
32. (Currently Amended) Optical fiber apparatus, comprising:  
an optical fiber having a first section and a second section coupled to the first section, the first section having a gain medium including a first active material and the second section having a gain medium including a second active material;  
a first reflector disposed in the first section of the optical fiber, the first reflector being configured to reflect substantially all energy impinging thereon at a first wavelength;  
a second reflector disposed in the optical fiber outside the first section of the optical fiber, the second reflector being configured to reflect substantially all energy impinging thereon at the first wavelength;

a third reflector disposed in the optical fiber, a fourth reflector disposed in the optical fiber and a fifth reflector disposed in the optical fiber; and

~~The fiber of claim 26, further comprising a suppressor disposed in the optical fiber, the suppressor being capable of substantially suppressing the propagation of energy within the optical fiber at a wavelength corresponding to a higher order Raman shift wavelength than the first wavelength.~~

33. (Currently Amended) The optical fiber apparatus of claim 32, wherein the suppressor is disposed in the first section of the optical fiber.

34. (Currently Amended) The optical fiber apparatus of claim 33, wherein the suppressor is between the first and fifth reflectors.

35. (Currently Amended) The optical fiber apparatus of claim 32, wherein the suppressor comprises a long period grating[[s]].

36. (Currently Amended) The optical fiber apparatus of claim 32, wherein the first and second sections are spliced together.

37. (Currently Amended) The optical fiber apparatus of claim 32, wherein the first active material comprises  $\text{GeO}_2$ .

38. (Currently Amended) The optical fiber apparatus of claim [[38]] 37, wherein the second active material comprises  $\text{P}_2\text{O}_5$ .

39. (Currently Amended) The optical fiber apparatus of claim 32, wherein the second active material comprises  $\text{P}_2\text{O}_5$ .

40. (Currently Amended) The optical fiber apparatus of claim 41, further comprising a third reflector disposed in the first section of the optical fiber and between the first and second reflectors, the third reflector being configured to reflect substantially all energy impinging thereon at a second wavelength different than the first wavelength.

41. (Currently Amended) Optical fiber apparatus, comprising:  
an optical fiber having a first section and a second section coupled to the first section, the first section having a gain medium including a first active material and the second section having a gain medium including a second active material;  
a first reflector disposed in the first section of the optical fiber, the first reflector being configured to reflect substantially all energy impinging thereon at a first wavelength;  
a second reflector disposed in the optical fiber outside the first section of the optical fiber, the second reflector being configured to reflect substantially all energy impinging thereon at the first wavelength; and  
~~The fiber of claim 1, further comprising~~ a suppressor disposed in the first section of the optical fiber and between the first and second reflectors, the suppressor being capable of substantially suppressing the propagation of energy within the optical fiber at a wavelength corresponding to a higher order Raman shift wavelength than the first wavelength.
42. (Currently Amended) The optical fiber apparatus of claim 41, wherein the suppressor comprises a long period grating.
43. (Currently Amended) The optical fiber apparatus of claim [[1]] 3, wherein the first and second sections of the optical fiber are contiguous.
44. (Currently Amended) The optical fiber apparatus of claim [[1]] 3, wherein the fiber is configured to be a fiber laser.
45. (Currently Amended) The optical fiber apparatus of claim [[1]] 3, wherein the fiber is configured to be a fiber amplifier.
46. (Currently Amended) The optical fiber apparatus of claim 41 wherein said first active material is different than said second active material. A system, comprising:  
an energy source capable of emitting energy at a pump wavelength; and  
a fiber, comprising:

an optical fiber having a first section and a second section coupled to the first section; the first section having a gain medium including a first active material and the second section having a gain medium including a second active material;

a first reflector disposed in the first section of the optical fiber, the first reflector being substantially totally reflective at a first wavelength; and

a second reflector disposed in the optical fiber outside the first section of the optical fiber, the second reflector being substantially totally reflective at a second wavelength;

wherein the energy source and the optical fiber are configured so that energy at the pump wavelength emitted by the energy source can be coupled into the optical fiber.

47. (Currently Amended) The optical fiber apparatus of claim 46 comprising a third reflector configured to reflect energy impinging thereon having a second wavelength that is different than the first wavelength. ~~The system of claim 46, wherein the energy source comprises a laser.~~

48. (Currently Amended) The optical fiber apparatus of claim 47 wherein the third reflector is between the first and second reflectors and is configured to reflect substantially all energy impinging thereon at the second wavelength. ~~The system of claim 47, wherein the energy source is capable of lasing at the pump wavelength.~~

49. (Currently Amended) The optical fiber apparatus of claim 47 wherein the third reflector is configured to partially reflect energy impinging thereon at the second wavelength. ~~The system of claim 46, wherein the first material is the same as the second material.~~

50. (Currently Amended) The optical fiber apparatus of claim 46 wherein the first and second sections are coupled by a lens. ~~The system of claim 46, wherein the first active material is different than the second active material.~~

51. (Currently Amended) The optical fiber apparatus of claim 47 comprising a fourth reflector disposed in the optical fiber between said first and second reflectors, the fourth reflector configured to reflect substantially all energy impinging thereon at the second wavelength. ~~The system of claim 46, wherein the fiber is configured to be a fiber laser.~~

52. (Currently Amended) The optical fiber apparatus of claim 51, wherein fiber of the second section having said second active material is interposed between the third and fourth reflectors and has a first length and wherein if any fiber of the first section having said first active material is interposed between the third and fourth reflectors the length of such fiber is less than the first length. ~~The system of claim 46, wherein the fiber is configured to be a fiber amplifier.~~

53. (Currently Amended) [[A]]Optical fiber apparatus, comprising:  
an optical fiber having a first section and a second section ~~spliced~~coupled to the first section, the first section having a gain medium including a first active material and the second section having a gain medium including a second active material different than the first active material;

a first reflector disposed in ~~the first section of~~ the optical fiber, the first reflector being configured to reflect substantially all energy impinging thereon at a first wavelength;

a second reflector disposed in ~~the second section of~~ the optical fiber, the second reflector being configured to reflect substantially all energy impinging thereon at the first wavelength;

a third reflector disposed in ~~the second section of~~ the optical fiber, the third reflector being configured to partially reflect energy impinging thereon at a second wavelength different than the first wavelength; and

a fourth reflector disposed in ~~the second section of~~ the optical fiber and between the first and third reflectors, the fourth reflector being configured to reflect substantially all energy impinging thereon at the second wavelength.

54. (Currently Amended) The optical fiber apparatus of claim 53, further comprising  
a fifth reflector in ~~the first section of~~ the optical fiber and between the first and fourth reflectors, the fifth reflector being configured to reflect substantially all energy impinging thereon at a third wavelength different than the first and second wavelengths.

55. (Currently Amended) The optical fiber apparatus of claim 54, further comprising  
a suppressor in ~~the first section of~~ the optical fiber and between the first and fifth reflectors, the suppressor being capable of substantially suppressing the propagation of energy within the



optical fiber at a wavelength corresponding to a higher order Raman shift wavelength than the first wavelength.

56. (Currently Amended) The optical fiber apparatus of claim 55, wherein the first active material comprises  $P_2O_5$ .

57. (Currently Amended) The optical fiber apparatus of claim 55, wherein the first active material comprises  $GeO_2$ .

58. (Currently Amended) The optical fiber apparatus of claim 57, wherein the second active material comprises  $P_2O_5$ .

59. (Currently Amended) The optical fiber apparatus of claim 58, wherein the first and second sections of the optical fiber are spliced together.

60. (Currently Amended) The optical fiber apparatus of claim 58, wherein the first and second sections of the optical fiber are contiguous.

61. (Currently Amended) The optical fiber apparatus of claim 53, further comprising a suppressor in ~~the first section of~~ the optical fiber and between the first and fifth reflectors, the suppressor being capable of substantially suppressing the propagation of energy within the optical fiber at a wavelength corresponding to a higher order Raman shift wavelength than the first wavelength.

62. (Currently Amended) The optical fiber apparatus of claim 53, wherein the first active material comprises  $GeO_2$ .

63. (Currently Amended) The optical fiber apparatus of claim 62, wherein the second active material comprises  $P_2O_5$ .

64. (Currently Amended) The optical fiber apparatus of claim 53, wherein the first active material comprises  $P_2O_5$ .

65. (Currently Amended) The optical fiber apparatus of claim 64, wherein the second active material comprises  $\text{GeO}_2$ .

66. (Currently Amended) The optical fiber apparatus of claim 53, wherein the first and second sections of the optical fiber are spliced together.

67. (Currently Amended) The optical fiber apparatus of claim 53, wherein the first and second sections of the optical fiber are contiguous.

68. (Currently Amended) The optical fiber apparatus of claim 53, wherein the fiber is configured to be a fiber laser.

69. (Currently Amended) The optical fiber apparatus of claim 53, wherein the fiber is configured to be a fiber amplifier.

70. (Currently Amended) A fiber-laser system, comprising:  
an energy source capable of emitting energy at a pump wavelength; and  
a fiber, comprising:

an optical fiber having a first section and a second section ~~spliced~~coupled to the first section, the first section having a gain medium including a first active material and the second section having a gain medium including a second active material different than the first active material;

a first reflector disposed in ~~the first section of~~ the optical fiber, the first reflector being configured to reflect substantially all energy impinging thereon at a first wavelength;

a second reflector disposed in ~~the second section of~~ the optical fiber, the second reflector being configured to reflect substantially all energy impinging thereon at the first wavelength;

a third reflector disposed in ~~the second section of~~ the optical fiber, the third reflector being configured to partially reflect energy impinging thereon at a second wavelength different than the first wavelength; and

a fourth reflector disposed in ~~the second section of~~ the optical fiber and between the first and third reflectors, the fourth reflector being configured to reflect substantially all energy impinging thereon at the second wavelength

wherein the energy source and the optical fiber are configured so that energy at the pump wavelength emitted by the energy source can be coupled into the optical fiber.

71. (Currently Amended) The system of claim [[64]] 70, wherein the energy source comprises a laser.

72. (Currently Amended) The system of claim [[65]] 71, wherein the energy source is capable of lasing at the pump wavelength.

73. (Original) The system of claim 70, wherein the fiber is configured to be a fiber laser.

74. (Original) The system of claim 70, wherein the fiber is configured to be a fiber amplifier.

75. (Currently Amended) [[A]]Optical fiber apparatus, comprising:

an optical fiber having N sections, the N sections being coupled together, at least one of the N sections of the optical fiber having a gain medium with an active material; and

a plurality of reflectors disposed in the optical fiber, said plurality including two reflectors having respective wavelengths at which each is configured to reflect substantially all of the energy impinging thereon and wherein said respective wavelengths can be the same or can be different;

wherein N is an integer having a value of at least three[[.]];

said N sections comprising a first section with an end and configured to receive energy at a wavelength  $\lambda_p$ , the first section of the optical fiber having a first reflector of said two reflectors disposed therein, the wavelength at which the first reflector is configured to reflect substantially all energy impinging thereon comprising  $\lambda_{s1}$ , where  $\lambda_{s1}^{-1} = \lambda_p^{-1} - \lambda_{s1}^{-1}$ , and  $(c/\lambda_{s1})$  is the Raman Stokes shift frequency for an active material in a gain medium in the first section of the optical fiber, and c is the speed of light;

wherein said  $N^{\text{th}}$  section comprises an end opposite the end of the first section, the  $N^{\text{th}}$  section of the optical fiber having the second reflector of said two reflectors disposed therein, the wavelength at which said second reflector is configured to reflect substantially all energy impinging thereon comprising  $\lambda_{s1n}$ , where for the  $N^{\text{th}}$  section  $\lambda_{s1n}^{-1} = \lambda_{s1(n-1)}^{-1} - \lambda_{rn}^{-1}$ , where  $n=N$  and  $(c/\lambda_{rn})$  is the Raman Stokes shift frequency for an active material in a gain medium in the  $N^{\text{th}}$  section of the optical fiber and wherein the  $(N-1)^{\text{th}}$  section creates energy having the wavelength  $\lambda_{s1(n-1)}$ ; and

wherein said optical fiber includes a third reflector disposed in the  $N^{\text{th}}$  section of the optical fiber, the third reflector being configured to partially reflect energy impinging thereon at the wavelength  $\lambda_{s1n}$ .

76. (Currently Amended) The optical fiber apparatus of claim [[75]] 87, ~~wherein N is three~~ wherein, for at least one of the  $m^{\text{th}}$  sections, the other reflector configured to reflect energy at the wavelength  $\lambda_{s1(m-1)}$  is disposed in the  $m^{\text{th}}$  section.

77. (Currently Amended) The optical fiber apparatus of claim 75, wherein N is four.

78. (Currently Amended) The optical fiber apparatus of claim 75, wherein N is five.

79. (Currently Amended) The optical fiber apparatus of claim 75, wherein N is six.

80. (Currently Amended) The optical fiber apparatus of claim 75, wherein at least two of the N sections of the optical fiber have a gain medium with an active material.

81. (Currently Amended) The optical fiber apparatus of claim 80, wherein the active material in one of the at least two of the N sections of the optical fiber is different than an active material of another of the N sections of the optical fiber having a gain medium.

82. (Currently Amended) The optical fiber apparatus of claim 75, wherein each of the N sections of the optical fiber have a gain medium with an active material.

83. (Currently Amended) The optical fiber apparatus of claim [[75]] 87, wherein, for at least one of the  $m^{\text{th}}$  sections, the other reflector configured to reflect energy at the wavelength  $\lambda_{s1(m-1)}$  is disposed outside of the  $m^{\text{th}}$  section. ~~the optical fiber has a first section with an end configured to receive energy at a wavelength  $\lambda_p$ , the first section of the optical fiber having a first reflector disposed therein, the first reflector being configured to reflect substantially all energy impinging thereon at a wavelength  $\lambda_{s1}$ , where  $\lambda_{s1}^{-1} = \lambda_p^{-1} - \lambda_{st}^{-1}$ , and  $(c/\lambda_{st})$  is the Raman Stokes shift frequency for an active material in a gain medium in the first section of the optical fiber, and  $c$  is the speed of light.~~

84. (Currently Amended) The optical fiber apparatus of claim [[83]] 89, wherein, for at least one of the  $m^{\text{th}}$  sections, the other reflector configured to reflect energy at the wavelength  $\lambda_{s1(m-1)}$  is disposed in the  $m^{\text{th}}$  section. ~~the optical fiber has an  $N^{\text{th}}$  section with an end opposite the end of the first section, the  $N^{\text{th}}$  section of the optical fiber having a first reflector disposed therein, the first reflector being configured to reflect substantially all energy impinging thereon at a wavelength  $\lambda_{s1n}$ , where  $\lambda_{s1n}^{-1} = \lambda_{s1(n-1)}^{-1} - \lambda_{stn}^{-1}$ , and  $(c/\lambda_{stn})$  is the Raman Stokes shift frequency for an active material in a gain medium in the  $N^{\text{th}}$  section of the optical fiber.~~

85. (Currently Amended) The optical fiber apparatus of claim [[84]] 89, wherein, for at least one of the  $m^{\text{th}}$  sections, the other reflector configured to reflect energy at the wavelength  $\lambda_{s1(m-1)}$  is disposed outside of the  $m^{\text{th}}$  section. ~~the  $N^{\text{th}}$  section of the optical fiber has a second reflector disposed therein, the second reflector being configured to partially reflect energy impinging thereon at the wavelength  $\lambda_{s1n}$ .~~

86. (Currently Amended) The optical fiber apparatus of claim [[85]] 75, wherein the  $N^{\text{th}}$  section of the optical fiber has an ~~third~~ additional reflector disposed therein, the ~~third~~ additional reflector being configured to reflect substantially all energy impinging thereon at the wavelength  $\lambda_{s1(n-1)}$ , where  $\lambda_{s1(n-1)}^{-1} = \lambda_{s1(n-2)}^{-1} - \lambda_{st(n-1)}^{-1}$ , and  $(c/\lambda_{st(n-1)})$  is the Raman Stokes shift frequency for the active material in the  $(N-1)^{\text{th}}$  section of the fiber and the  $(N-2)^{\text{th}}$  section creates energy at the wavelength  $\lambda_{s1(n-2)}$ .

87. (Currently Amended) The optical fiber apparatus of claim 86, wherein for each of the remaining sections of the optical fiber, the remaining sections being those other than the first

and  $N^{\text{th}}$  sections and being individually designated by the index  $m$ , the fiber has two reflectors disposed therein, one of the reflectors being disposed in [[each of]] the [[remaining]]  $m^{\text{th}}$  section[[s]] of the optical fiber and being configured to reflect substantially all energy impinging thereon at a wavelength  $\lambda_{s1m}$ , where  $\lambda_{s1m}^{-1} = \lambda_{s1(m-1)}^{-1} - \lambda_{rm}^{-1}$ , and  $(c/\lambda_{rm})$  is the Raman Stokes shift frequency for an active material in the  $m^{\text{th}}$  section of the fiber and the other reflector being configured to reflect energy at the wavelength  $\lambda_{s1(m-1)}$  and  $\lambda_{s1}$  represents the same wavelength as  $\lambda_{s1}$

88. (Currently Amended) The optical fiber apparatus of claim [[87]] 53, wherein fiber of the second section having said second active material is interposed between the third and fourth reflectors and has as first length wherein if any fiber of the first section having said first active material is interposed between the third and fourth reflectors the length of such fiber is less than the first length, the other of the reflectors disposed in each of the remaining sections of the optical fiber is configured to reflect substantially all energy impinging thereon at a wavelength  $\lambda_{s1(m-1)}$ , where  $\lambda_{s1(m-1)}^{-1} = \lambda_{s1(m-2)}^{-1} - \lambda_{r(m-1)}^{-1}$ , and  $(c/\lambda_{r(m-1)})$  is the Raman Stokes shift frequency for an active material in an immediately preceding section of the optical fiber.

89. (Currently Amended) The optical fiber apparatus of claim [[88]] 75, wherein for each of the remaining sections of the optical fiber, the remaining sections being those other than the first and  $N^{\text{th}}$  sections and being individually designated by the index  $m$ , the fiber has two reflectors disposed therein, one of the reflectors being disposed in ~~each of the remaining  $m^{\text{th}}$~~  section[[s]] of the optical fiber and being configured to reflect substantially all energy impinging thereon at a wavelength  $\lambda_{s1m}$ , where  $\lambda_{s1m}^{-1} = \lambda_{s1(m-1)}^{-1} - \lambda_{rm}^{-1}$ , and  $(c/\lambda_{rm})$  is the Raman Stokes shift frequency for an active material in the  $m^{\text{th}}$  section of the fiber and the other reflector being configured to reflect energy at the wavelength  $\lambda_{s1(m-1)}$  and  $\lambda_{s1}$  represents the same wavelength as  $\lambda_{s1}$

90. (Currently Amended) The optical fiber apparatus of claim [[89]]88, wherein a length of fiber of the first section having the first active material and a length of fiber of the second section having the second active material are interposed between said first and second reflectors, the other of the reflectors disposed in each of the remaining sections of the optical fiber is configured to reflect substantially all energy impinging thereon at a wavelength  $\lambda_{s1(m-1)}$

where  $\lambda_{s(m-1)}^{-1} = \lambda_{s(m-2)}^{-1} - \lambda_{s(m-1)}^{-1}$ , and  $(c/\lambda_{s(m-1)})$  is the Raman Stokes shift frequency for an active material in an immediately preceding the  $(m-1)^{\text{th}}$  section of the optical fiber.

91. (Currently Amended) The optical fiber apparatus of claim 75, wherein the fiber is configured to be a fiber laser.

92. (Currently Amended) The optical fiber apparatus of claim 75, wherein the fiber is configured to be a fiber amplifier.

93. (Currently Amended) A fiber system, comprising:  
 an energy source; and  
the optical fiber apparatus as recited in claim 75, said energy source coupled to the optical fiber apparatus,  
a fiber, comprising:  
an optical fiber having N sections, the N sections being coupled together, at least one of the N sections of the optical fiber having a gain medium with an active material; and  
a plurality of reflectors disposed in the optical fiber, said plurality including two reflectors having respective wavelengths at which each is configured to reflect substantially all of the energy impinging thereon and wherein said respective wavelengths can be the same or can be different;  
wherein N is an integer having a value of at least three, and the energy source and the optical fiber are configured so that energy at a wavelength emitted by the energy source can be coupled into the optical fiber.

94. (Original) The system of claim 93, wherein the fiber is configured to be a fiber laser.

95. (Original) The system of claim 93, wherein the fiber is configured to be a fiber amplifier.

96. (Currently Amended) A fiber laser or amplifier, comprising:  
 an optical fiber having at least first and second sections coupled together, the first section having a first gain medium with a first active material, the second section having a second gain

medium with a second active material that is different than the first active material, the optical fiber being configured to be capable of receiving energy at a first wavelength and to be capable of outputting energy at a second wavelength longer than the first wavelength; and

a plurality of reflectors disposed in the optical fiber, the plurality of reflectors being configured so that energy propagating in the optical fiber at the first wavelength undergoes at least one Raman Stokes shift to create energy in the optical fiber at the second wavelength, and so that, when the optical fiber receives energy at the first wavelength, a power output by the optical fiber at the second wavelength is at least about 55% of a power of the energy the optical fiber receives at that first wavelength.

97. (Currently Amended) The fiber laser of claim 96, wherein the plurality of reflectors comprises first and second reflectors each configured to reflect substantially all energy impinging thereon at a selected wavelength, ~~the first active material is the same as the second active material.~~

98. (Currently Amended) The fiber laser of claim 96, comprising a third reflector disposed in the optical fiber between the first and second reflectors, ~~wherein the first active material is different than the second active material.~~

99. (Original) The fiber laser of claim 96, wherein energy propagating in the optical fiber at the first wavelength undergoes at least two Raman Stokes shifts to create energy in the optical fiber at the second wavelength.

100. (Currently Amended) The fiber laser of claim 96, wherein, when the optical fiber receives energy at the first energy wavelength, a power output by the optical fiber at wavelengths other than the first and second wavelengths is at most about 45% of the power of the energy the optical fiber receives at that first wavelength.

101. (Original) The fiber laser of claim 96, wherein the first and second sections are directly coupled together.



102. (Original) The fiber laser of claim 96, wherein the first and second sections are spliced together.

103. (Original) The fiber laser of claim 96, wherein energy propagating in the optical fiber at the first wavelength undergoes a Raman Stokes shift based interaction with the active material contained in the gain medium of the first section of the optical fiber to form energy at a first intermediate wavelength, and energy at the first intermediate wavelength undergoes a Raman Stokes shift based on interaction with the active material contained in the gain medium of the second section of the optical fiber to form a second intermediate wavelength.

104. (Original) The fiber laser of claim 103, wherein the second intermediate wavelength is the same as the second wavelength.

105. (Original) The fiber laser of claim 103, wherein energy propagating in the optical fiber at the second intermediate wavelength undergoes additional Raman Stokes shifts to form energy at the second wavelength.

106. (Currently Amended) Optical apparatus~~An article~~, comprising:  
a Raman fiber laser or amplifier for lasing or providing amplification responsive to receiving energy having a pump wavelength  $\lambda_p$ , said Raman fiber laser or amplifier comprising an optical fiber having multiple a plurality of sections, with at least two of the plurality of multiple sections having Raman gain media containing different active materials for creating Stoke-shifted energy, said Raman fiber laser or amplifier further including a first reflector configured to reflect energy impinging thereon at the wavelength  $\lambda_{s1}$ , where  $\lambda_{s1}^{-1} = \lambda_p^{-1} - \lambda_{r1}^{-1}$ , and  $(c/\lambda_{r1})$  is the Raman Stokes shift frequency for one of the different active materials, and  $c$  is the speed of light.

107. (Currently Amended) The optical apparatus of claim 106 comprising a second reflector, said second reflector being configured to reflect energy impinging thereon at the wavelength  $\lambda_{s1}$ . The article of claim 106, wherein the optical fiber is configured as a fiber amplifier.

108. (Currently Amended) The optical apparatus of claim 107 wherein each of said first and second reflectors is configured to reflect substantially all of the energy impinging thereon at  $\lambda_{s1}$ . The article of claim 106, wherein the optical fiber is configured as a fiber laser.

109. (Currently Amended) The optical apparatus of claim 107 comprising a third reflector, said third reflector being configured to reflect energy impinging thereon at a wavelength different than  $\lambda_{s1}$ . A system, comprising:

an energy source capable of emitting energy at a pump wavelength; and

a Raman fiber amplifier, comprising:

an optical fiber having a first section and a second section coupled to the first section; the first section having a gain medium including a first active material and the second section having a gain medium including a second active material;

wherein the energy source and the optical fiber are configured so that energy at the pump wavelength emitted by the energy source can be coupled into the optical fiber.

110. (Currently Amended) The optical apparatus of claim 106 comprising a second reflector being configured to reflect energy impinging thereon at the wavelength  $\lambda_{s1}$ , said first and second reflectors to be referred to as a first pair of reflectors, said optical apparatus further comprising a second pair reflectors, each reflector of said second pair being configured to reflect energy impinging thereon at the wavelength  $\lambda_{s12}$ , where  $\lambda_{s12}^{-1} = \lambda_{s1}^{-1} - \lambda_{r2}^{-1}$ , and  $(c/\lambda_{r2})$  is the Raman Stokes shift frequency for the other of the different active materials, and c is the speed of light. The system of claim 109, wherein the first active material is the same as the second active material.

111. (Currently Amended) The optical apparatus of claim 110 wherein fiber comprising one of said different active materials is not interposed between reflectors of one of said pairs of reflectors. The system of claim 110, wherein the first active material is different than the second active material.

112. (Currently Amended) The optical apparatus of claim 110 wherein a length of fiber comprising one of said different active materials and a length of fiber comprising the other

of said different active materials are interposed between the reflectors of one of said pairs of reflectors.~~The system of claim 110, wherein the energy source comprises a laser.~~

113. (Currently Amended) The optical apparatus of claim 110 wherein fiber comprising one of said different active materials is not interposed between reflectors of the other of said pairs of reflectors.~~The system of claim 112, wherein the energy sources is capable of lasing at the first wavelength.~~

114. (Currently Amended) The optical apparatus of claim 112 wherein a selected length of fiber comprising one of said different materials is interposed between the reflectors of the other pair of reflectors.~~An article, comprising:~~

~~a Raman fiber amplifier, comprising,~~

~~an optical fiber having N sections, the N sections being coupled together, at least one of the N sections of the optical fiber having a gain medium with an active material,~~

~~wherein N is an integer having a value of at least three.~~

115. (Currently Amended) The optical apparatus of claim 114 wherein if any length of fiber comprising the other of said different materials is interposed between the reflectors of said other pair of reflectors, such length is less than said selected length.  
~~The fiber amplifier of claim 114, wherein N is three.~~

116. (Currently Amended) The optical apparatus of claim 110 wherein one of said reflectors of said second pair is located between said reflectors of said first pair.~~The fiber amplifier of claim 114, wherein N is four.~~

117. (Currently Amended) The optical apparatus of claim 116 wherein each of said reflectors of said first pair is configured to reflect substantially all of the energy impinging thereon at the wavelength  $\lambda_{s1}$ .~~The fiber amplifier of claim 114, wherein N is five.~~

118. (Currently Amended) The optical apparatus of claim 117 wherein each of said reflectors of said second pair is configured to reflect substantially all of the energy impinging thereon at the wavelength  $\lambda_{s2}$ .~~The fiber amplifier of claim 114, wherein N is six.~~

119. (Currently Amended) The optical apparatus of claim 110 wherein one of said different active materials comprises  $\text{GeO}_2$ .~~The fiber amplifier of claim 114, wherein at least two of the N sections of the optical fiber have a gain medium with an active material.~~

120. (Currently Amended) The optical apparatus of claim 110 wherein one of said different active materials comprises  $\text{P}_2\text{O}_5$ .~~The fiber amplifier of claim 119, wherein the active material in one of the at least two of the N sections of the optical fiber is different than an active material of another of the N sections of the optical fiber having a gain medium.~~

121. (Currently Amended) The optical apparatus of claim 120 wherein the other of said different active materials comprises  $\text{GeO}_2$ .~~The fiber amplifier of claim 114, wherein each of the N sections of the optical fiber have a gain medium with an active material.~~